

### REMARKS

Upon entry of the present amendment, claims 9, and 13-23 will remain pending in the above-identified application and stand ready for further action on the merits. Claims 1-8 and 10-12 have been canceled without prejudice or disclaimer of the subject matter contained therein. Claims 9 and 13 are withdrawn from consideration. New claims 14-23 have been added.

The instant amendments made herein to the claims do not incorporate new matter into the application as originally filed. For example, from the nature of the invention, claim 1 has been rewritten as new claim 14 so as to further clarify that tubes, nozzles, etc. are connected to specific gas sources, respectively. Claims 15-23 correspond to claims 2-8 and 10-11, respectively.

Further, the instant amendment does not raise substantial new issues for the Examiner's consideration and require no further search on the Examiner's part. At the same time, the instant amendments put the pending claims in condition for allowance and into a more proper format for issuance in a United States patent, by overcoming all outstanding rejections and objections of record.

Accordingly, proper consideration of each of the pending claims is respectfully requested at present, as is entry of the present amendment.

### *Election/Restrictions*

In the outstanding Office Action, claims 9 and 13 have been withdrawn from consideration.

However, Applicants respectfully request rejoinder and consideration of claims 9 and 13 (i.e. method claim) since (1) there are overlapping technical features between the method claims and the product claims (i.e., claims 14-23) and (2) there would be no undue burden on the Examiner to examine both the product claims and the method claims.

Thus, Applicants respectfully request that these claims be rejoined.

### *Claim Objections*

Claim 3 has been objected to based upon informalities therein.

However, claim 3 has been canceled in the present amendment.

Accordingly, this objection has been overcome. Applicants respectfully request that the Examiner withdraw this objection.

### *35 USC § 112, 2nd Paragraph Rejection*

At page 3 of the outstanding Office Action, the Examiner has rejected claims 5-8 under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicants respectfully traverse.

In the instant amendment, claims 5-8 have been canceled. New claims 18-21 correspond to dependent claims 5-8, respectively. In claims 18-21, it has been clarified that the combustible gas and the combustion-supporting gas in independent claim 14 are hydrogen gas and oxygen gas, respectively.

Accordingly, Applicants respectfully request that the Examiner withdraw this rejection.

***Claim Rejections under 35 U.S.C. § 102(b)***

In the Office Action, at page 3, the Examiner sets forth a rejection of claims 1 and 5-8 under 35 USC § 102(b) over Kamiya JP '035 (JP 05-009035).

Further, at the paragraph beginning with "Response to Arguments" at page 7 of the Office Action, the Examiner states:

*"...the applicant mentions that the burner of Kamiya feed different gases to the different tubes, which is not in line with the functional limitations of the claim1. The intended use of the burner does not provide a structural limitation to the burner."*

Applicants respectfully traverse this rejection. Reconsideration and withdraw of this rejection is respectfully requested based on the following considerations.

In independent claim 14, it is further clarified that each of tubes, shells and nozzles is connected to the specific gas source (i.e., a combustible gas source or a combustion-supporting gas source), respectively, in addition to the limitations of claim 1, so that the present invention would be further distinguished from the cited references.

The Examiner asserts that Kamiya JP '035 discloses a burner comprising a multi-tube assembly of three or more tubes and two tubular shells with nozzles disposed in the annular space of the tubular shells.

For purposes of illustration, not limitation, the Examiner's attention is directed to Applicants' Fig. 1. The novel burner of the instant invention comprises a multi-tube assembly 1 **consisting of** (emphasis added) three tubes: a center tube (2) for feeding a silica-forming compound, a first outer tube (3) for feeding oxygen gas and a second outer tube (4) for feeding hydrogen gas. The multi-tube assembly is surrounded by a first tubular shell (5), a plurality of first nozzles (6), a second

tubular shell (7) and a plurality of second nozzles (8). Applicants have discovered that the novel burner comprising a center tube with a **triple structure** (emphasis added) for feeding a silica-forming gas, hydrogen and oxygen produces synthetic quartz glass ingots with reduced transmittance variations between the periphery and the center of the ingot. Further, as recited in claim 14, the tubes and the nozzles, etc. are connected to the specific gas sources, respectively, as follows:

*the center tube is connected to a silica-forming compound source;*  
*the first outer tube is connected to a combustion-supporting gas source (e.g.,  $O_2$ );*  
*the second outer tube is connected to a combustible gas source (e.g.,  $H_2$ );*  
*the first tubular shell is connected to a combustible gas source (e.g.,  $H_2$ );*  
*the first nozzles is connected to a combustion-supporting gas source (e.g.,  $O_2$ );*  
*the second tubular shell is connected to a combustible gas source (e.g.,  $H_2$ ); and*  
*the second nozzles is connected to a combustion-supporting gas source (e.g.,  $O_2$ ).*

On the other hand, the burner of Kamiya JP '035 comprises a center tube (refer to Drawing 1 of Kamiya JP '035), a second tube for feeding hydrogen gas, a third tube for feeding argon gas, a fourth tube for feeding oxygen gas and a fifth tube for feeding argon gas. The supply of argon gas between the hydrogen and oxygen gas supplies in this burner would cool the flame and allow the flame to spread out, whereby the flame is not focused and the high-temperature region at the center would become uneven, thus resulting in variations between the periphery and the center of the ingot. In stark contrast, Applicants' novel burner ensures that the high-temperature region is extended through out the flame, resulting in an ingot with uniform characteristics from the center to the periphery.

Moreover, the first tube of the burner of the instant invention supplies a combustion-supporting gas, such as oxygen, while the second tube supplies a combustible gas, such as

hydrogen. Contrary to Applicants' novel burner, the first tube of Kamiya JP '035 is designed for feeding hydrogen gas, whereas the third tube is the one designed for feeding oxygen gas.

Clearly, Kamiya JP '035 fails to teach or suggest all the limitations of independent claim 1 and thus fails to anticipate the same.

Because the invention, as set forth in Applicants' claims, is not disclosed by the cited prior art, reconsideration and withdrawal of this rejection are respectfully requested.

***Claim Rejection - 35 U.S.C. § 103(a)***

In the Office Action, at pages 4-6 of the Office Action, the Examiner sets forth a rejection of claims 2-3 and 10-11 under 35 USC § 103(a) over Kamiya JP '035 in view of Komine US' 639 (U.S. 6,374,639), a rejection of claim 4 under 35 USC § 103(a) over Kamiya JP '035 in view of Roba US '092 (U.S. 2004/0112092), and a rejection of claim 12 under 35 USC § 103(a) over Kamiya JP '035 in view of Komine US' 639 and Roba US '092.

Applicants respectfully traverse. Reconsideration and withdraw of this rejections is respectfully requested based on the following considerations.

***Distinctions over the Cited References and the Combinations thereof***

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally,

the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

As discussed above, Kamiya JP '035 fails to explicitly or impliedly disclose 1) a burner comprising a multi-tube assembly **consisting of** (emphasis added) three tubes (i.e., a center tube for feeding a silica-forming compound, a first outer tube for feeding oxygen gas and a second outer tube for feeding hydrogen gas, wherein the multi-tube assembly is surrounded by a first tubular shell, a plurality of first nozzles, a second tubular shell and a plurality of second nozzles), and 2) the specific gas sources connected to the specific tubes, etc.

Furthermore, as acknowledged by the Examiner, Kamiya JP '035 fails to teach or suggest that the cross sectional area of gas discharge ports of the first nozzles disposed in the first tubular shell accounts for at least 5% of the cross-sectional area of the annular space between the multi-tube assembly and the first tubular shell, or that the cross sectional area of gas discharge ports of the second nozzles disposed in the second tubular shell accounts for at least 5% of the cross-sectional area of the annular space between the first and second tubular shells. Komine US' 639 also fails to cure these deficiencies.

The burner of Komine US' 639 comprises a center tube, a first outer tube, a second outer tube, a first tubular shell and first nozzles. Contrary to the burner of the instant invention, the burner of Komine US' 639 does not have a second tubular shell and second nozzles. Clearly, it would be impossible for this reference to teach that the cross sectional area of gas discharge ports of the second nozzles disposed in the second tubular shell accounts for at least 5% of the cross-sectional

area of the annular space between the first and second tubular shells, because the reference lacks a second tubular shell and second nozzles.

In addition, if the second tubular shell and the second nozzles are not provided, the central portion and the peripheral portion of ingot growth surface are not formed in the same conditions upon the deposition and the vitrification steps, whereby the initial transmittance of the peripheral portion of the ingot would become lower than the initial transmittance of the central portion of the ingot. This phenomenon, as well as the burner disclosed by Komine US' 639, is shown in Comparative Example, and Figures 3 and 5 of the present invention. Thus, Kamiya JP '035 merely discloses the state of the prior art previously acknowledged by Applicants.

Furthermore, assuming *arguendo* that Komine US' 639 cured the deficiencies of Kamiya JP '035 (a point which Applicants do not concede), it is noted that references cannot be arbitrarily combined. There must be some reason why one of ordinary skill in the art would be motivated to make the proposed combination of the primary and secondary references. *In re Nomiya*, 184 USPQ 607 (CCPA 1975). Kamiya '035 is directed to a manufacture approach of the soot base material for optical fibers. On the other hand, Komine US' 639 is directed to the removal of chlorine from silica glass. One skilled in the art would not have been motivated to combine or modify these references, absent hindsight gleaned from Applicants' application. For this reason alone, the 35 U.S.C. § 103 rejection of Kamiya JP '035 in view of Komine US' 639 must be withdrawn. Further, even assuming that these references are combinable, each and every element of claims 15 and 16 is not shown or suggested by the combination, as previously disclosed.

Further, Roba US '092 is directed to a deposition process for manufacturing an optical preform. Contrary to the instant invention, Roba US '092 does not teach or suggest a burner comprising first and second nozzles for feeding a combustion supporting gas such as oxygen. If such nozzles are not provided, the combustion efficiency would not increase and the high-temperature region would not be uniformly distributed throughout the entire flame, thus resulting in ingots with non-uniform characteristics from the center to the periphery. In addition, it is respectfully submitted that one skilled in the art would not have been motivated to combine the teachings of Roba '092 with those of Kamiya '035 or to modify these teachings in an attempt to arrive at the novel burner of the instant invention.

As explained above, since none of the cited references provide one skilled in the art any motivation to arrive at the present invention, a *prima facie* case of obviousness cannot be established even if the cited references are combined. Thus, the present invention is not obvious over the cited references.

Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

### CONCLUSION

Based upon the amendments and remarks presented herein, the Examiner is respectfully requested to issue a Notice of Allowance clearly indicating that each of the pending claims are allowed under the provisions of Title 35 of the United States Code.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Gerald M. Murphy, Jr. (Reg. No.



28,977) at the telephone number below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

Dated: May 7, 2007

Respectfully submitted,

By 

Gerald M. Murphy, Jr.

Registration No.: 28,977

BIRCH, STEWART, KOLASCH & BIRCH, LLP

8110 Gatehouse Road

Suite 100 East

P.O. Box 747

Falls Church, Virginia 22040-0747

(703) 205-8000

Attorney for Applicant